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HNF-19638

Revision 1

Unabated Emissions Estimate for the 296-B-1 Stack

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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Fluor Hanford

P.O. Box 1000

Richland, Washington

Contractor for the U.S. Department of Energy
Richland Operations Office under Contract DE-AC06-96RL13200

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Unabated Emissions Estimate for the 296-B-1 Stack

DL Johnson, Fluor Hanford

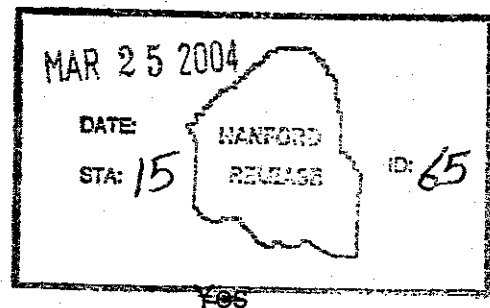
March, 2004

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Nancy A. Fouad 3-25-04
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RECORD OF REVISION

(1) Document Number

HNF-19638

Page 1

(2) Title

Unabated Emissions Estimate for the 296-B-1 Stack

Change Control Record

[illegible]

ENGINEERING DOCUMENT CHANGE CONTROL

Change Identification

1. Category:

☒ Direct Revision ☐ Supplemental Change ☐ Page Change
☐ Supersedure ☐ Cancel/Void ☐ New

2. Classification of Change, or if New, CB?

☐ Major ☒ Minor ☐ Conf Baseline (CB)

3. Date:

3-22-04

4. Originator's Name, Organization, MSIN, and Telephone No.:

Daniel L. Johnson, CP Environmental, L1-05, 373-4209

21. Release:

MAR 25 2004

DATE:

STA: 15

HANFORD
RELEASE

ID: 65

5. USQ Required?

USQ No.: FN-2004-002

☒ Yes ☐ No

CX No.: NA

6. Technical Authority:

DL Johnson

7. Project/Program (WMP, FFTF, etc.): CP

8. Area: 200 E

9. Building: 221-B.

10. Reviewer Designator: E, Q

11. Plan:

The objective was to provide an accurate to conservative measurement of the B-Plant potential emissions. The method chosen is as described in WAC 246-247-030(21)(d), "Sample the effluent upstream from all control devices, as approved by the department". This document will be provided to regulatory agencies for approval.

12. Criteria:

The criteria for designation of an emission unit as a major source is an unabated potential to emit in excess of 0.1 mrem/yr to the maximally exposed public individual.

13. Change or Document Description:

This document provides a description of the method used to measure concentrations of airborne radionuclides upstream of the B-Plant filtration system, and to estimate the potential unabated emissions for the 296-B-1 stack during normal, deactivated facility operations. The potential, unabated offsite dose is estimated to be 0.046 mrem/yr. Revision 1 added a section on QA to demonstrate how the measurements met appropriate QA requirements.

14. Documents Issued or Changed by this EDC:

Document	Page	Revision	Document Title or Comments
HNF-19638	ALL	0	Unabated Emissions Estimate for the 296-B-1 Stack

15. Technical Justification (Need):

The 296-B-1 stack is the current discharge point for the B-Plant ventilation system. The building was cleaned out and deactivated in the late 90's to minimize emissions potential, which included isolation of the old filtration system and stack (291-B-1), and installation of a new ventilation, filtration and stack system. Once B-Plant was deactivated in 1998, the building was placed in a minimal surveillance and maintenance mode. The 296-B-1 stack was designated a major stack in the beginning, until operations could demonstrate otherwise. Extremely low emissions made it a candidate for a more accurate and definitive assessment. The high cost of regulatory compliance for major stacks justifies the cost of an assessment that could lead to downgrading of the stack designation, thereby eliminating these requirements. This document details the method used to

ENGINEERING DOCUMENT CHANGE CONTROL (continued)

assess the 296-B-1 stack.

Evaluation and Coordination**16. Change or Document Impact:**

This document provides a basis for re-designation of the stack. Stack re-designation would affect regulatory stack sampling and monitoring requirements; regulatory documents including the Hanford Site AOP, stack registration, and an existing NOC; and site documentation including the FEMP.

17. Affected Documents:

Document Number	Page	Revision	Person Notified/Comments
BHI-01371	ALL	0	This FEMP document may be cancelled upon regulatory acceptance of stack downgrade.
HNF-1974	ALL	1	This Radionuclide NESHAPS PTE Assessment document should be updated to reflect this new assessment.

Verification**18. Verification:**

The methods used to determine stack emissions potential conform to site standards, as identified in HNF-3602. Internal reviews were performed by FH Monitoring and Reporting personnel to confirm method, and independent calculations were performed by Dale Dyekman to verify results.

19. Approvals/Reviews:

Initials, Last Name, Date, MSIN	Initials, Last Name, Date, MSIN
Technical Authority: <i>DL Johnson</i> 3-22-04 LI-05 DL Johnson (Engineer)	Technical Authority Manager: <i>SJ Giamberardini</i> 3/23/04 SJ Giamberardini (Engineering Manager)
Reviewer (Title): LP Diediker (Monitoring & Reporting) <i>LP Diediker</i> 3-22-04	Reviewer (Title): <i>HB Rew</i> (Quality Assurance) <i>HB Rew</i> 3/22/04 LI-06
Reviewer (Title): JA Bates (Interpretive Authority) <i>JA Bates</i> 3-22-04 HB-12	Reviewer (Title):

Solution**20. Change Description (Solution) - Continuation Sheet:**

Revision 1 added a section on QA to demonstrate how the measurements met appropriate QA requirements.

Unabated Emissions Estimate for the 296-B-1 Stack

PURPOSE

DOE Facilities are required to comply with EPA regulation (40 CFR 61, Subpart H) and DOH regulation (WAC 246-247). Continuous emission monitoring and test procedures are required for any release point which has a potential to emit radionuclides into the air in quantities which could cause a dose in excess of 0.1 mrem/yr to the maximally exposed public individual (i.e., major sources). Since the applicability of several regulatory requirements depends on the designation of the emission unit, it is beneficial to accurately assess the emission unit. This document is intended to provide a conservative, yet accurate assessment of the 296-B-1 stack.

SUMMARY

Stack release potential is estimated based on the EPA 40 CFR 61.93(b)(4)(ii) assumption that all pollution control equipment does not exist, but the emission unit operations were otherwise normal. The concentrations of airborne radionuclides were sampled upstream of the B-Plant filtration system, during normal operations. Based on laboratory analysis of the samples and subsequent dispersion modeling using the EPA approved model, the potential, unabated offsite dose is estimated to be 0.046 mrem/yr, which supports designation of the 296-B-1 stack as a minor source.

QUALITY ASSURANCE

The activities described in this document meet the quality assurance requirements for radioactive air sampling and for the calculation of a maximum public offsite dose from potential 296-B-1 stack emissions. Radioactive air emissions sampling and data handling is conducted in accordance with the applicable federal and state QA requirements. After sample collection and analysis, potential air emissions are calculated and the results are used to determine whether the 296-B-1 stack is a major or minor emission point according to methods approved by the U.S. Environmental Protection Agency, the Washington State Department of Health, and the U.S. Department of Energy. The duct velocity traverses, sampling, laboratory analysis and data handling activities were performed consistent with HNF-EP-0528-5, *NESHAP Quality Assurance Project Plan for Radioactive air Emissions*. This NESHAP QAPjP (HNF-EP-0528-5) is prepared in accordance with *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (QA/R-5)*, and 40 Code of Federal Regulations 61, Appendix B, Method 114, *Test Methods for Measuring Radionuclide Emissions from Stationary Sources*. Sample chain of

custody, analytes of interest, minimum detection limits, were conducted in accordance with the NESHAP QAPJP. The data verification and validation, and calibration of all measuring and test equipment were also performed as described in the NESHAP QAPJP. The dose calculations were performed using HNF-3602-1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. The 222-S Laboratory analyzed the samples per EPA prescribed procedures required by EPA's Method 114, in accordance with HNF-SD-CP-QAPP-016, *222-S Laboratory Quality Assurance Plan*. Data reduction and peer review were also performed in accordance with HNF-SD-CP-QAPP-016. Further details are included in this report, attachments, and references.

BACKGROUND

The 296-B-1 stack is the current discharge point for the B-Plant ventilation system. The building was cleaned out and deactivated in the late 90's, which included isolation of the old filtration system and stack (291-B-1), and installation of a new ventilation, filtration and stack system. Once B-Plant was deactivated in 1998, the building was placed in a minimal surveillance and maintenance mode. The new 296-B-1 stack was designated as a major stack in the beginning, until operations could demonstrate otherwise. Since the stack emissions have been extremely low, a definitive assessment was warranted. The remainder of this document details the method used to assess the 296-B-1 stack.

METHOD

The approach for determining the potential (unabated) emissions was to collect a representative air sample upstream of all filtration. The air concentrations measured represent the potential concentrations that would be emitted from the facility during an entire year without the pre-filter or HEPA filtration system. Sampling was performed over a period of one work-week at normal ventilation system operating conditions during a representative period.

Sampling Location

The air samples were obtained from the 30" diameter duct just upstream from where the air flow is split for the two filter banks (see Figure 2). The duct was accessed through an existing 1" port that had been installed as an aerosol test port as part of the original ventilation system design. The port is on the side of a straight section of the duct approximately 2 duct diameters downstream of a 90-degree bend in the duct (~ 72" from centerline of elbow to centerline of port) and approximately 1 diameter upstream of a tee in which the air flow splits (~28" from centerline of port to centerline of Tee). This location was determined to be the best sampling location in consideration of 40 CFR 60, Appendix A, Method 1 criteria (i.e. greater than 2 diameters downstream and greater than ½ diameter

upstream of disturbances). Air velocity data was obtained at this location to determine the velocity profile and to confirm that it was an adequate sampling location. The velocity profiles are shown below in Figure 1. The sample was taken from the east port, 9 ½" inside the duct (at the 4th velocity traverse point), thus the isokinetic velocity would have been approximately 3944 fpm. The sample probe tubing was ½" OD x .065" wall thickness; therefore an isokinetic sampling flow rate would be 2.9 cfm at this velocity. The sample flow rate was set below this, at 2.5 cfm, to ensure a slightly sub-isokinetic sampling condition and assure a conservative sample (per ANSI N13.1-1969 data, Appendix C, Table C1). A copy of the velocity test procedure and data are provided in Attachment 1. The sampling procedure, daily inspection reports and chain-of-custody data are provided in Attachment 2.

Figure 1

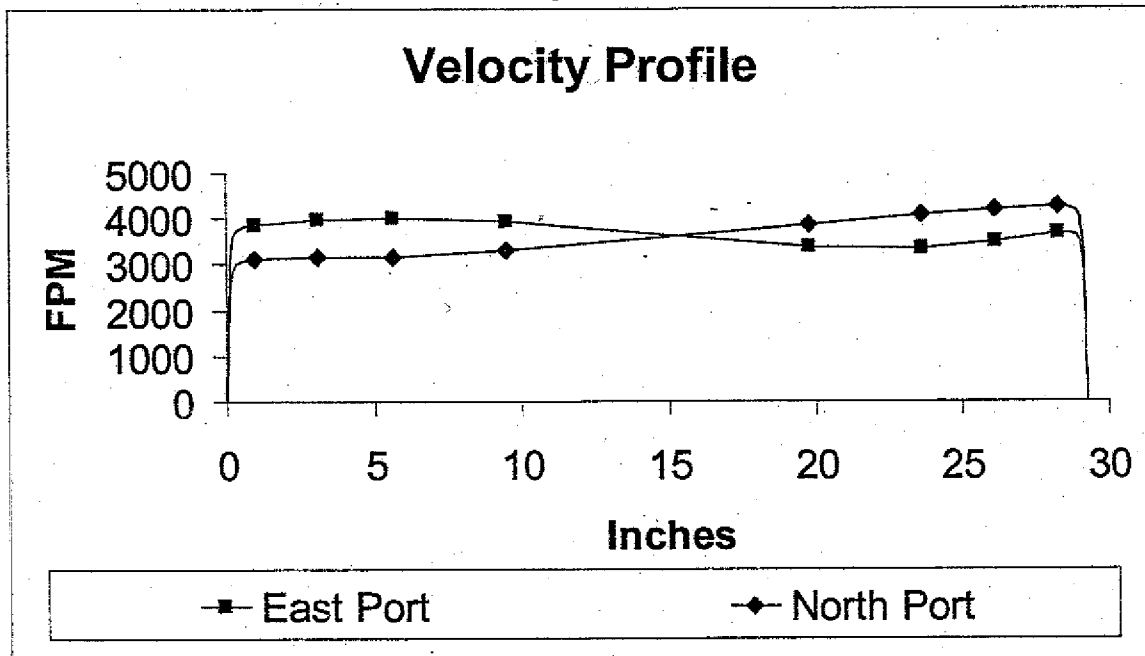
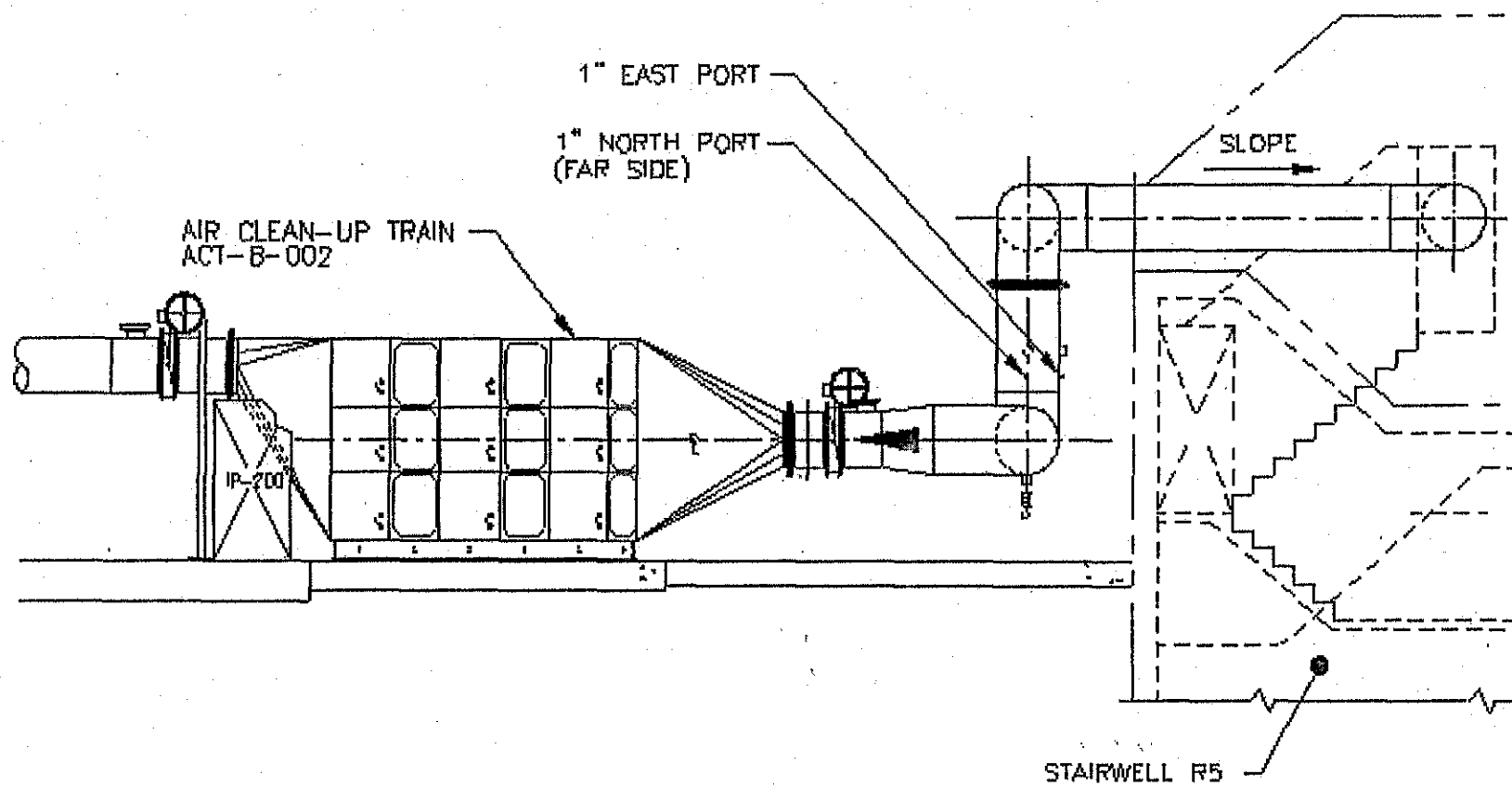


Figure 2



ELEVATION LKG NORTH

Laboratory Analysis

The laboratory radionuclide analyses were as follows: Total Alpha/Beta and Gamma Energy Analysis (GEA) on the primary sample filter and secondary filter, then Pu isotopic, Am-241, and Sr-90 on the composite filters; Total Alpha/Beta on each of 3 sequential probe rinses, then GEA, Pu isotopic, Am-241, and Sr-90 on the composite probe rinses. The two-stage sample filtration and separate filter analyses provided filter efficiency data. The three individual acid rinses of the probe and individual rinse analyses assured thorough removal of sample deposits. The sample filter results, adjusted for efficiency, and the composite probe rinses together provided an essentially quantitative sample. The isotopic radionuclide analyses were chosen based on known constituents; corroboration of the GEA and Total Alpha/Beta with isotopic results assured a comprehensive assay.

SAMPLE ANALYSIS RESULTS

The individual sample filter analyses provided data to determine sample filter efficiency. The efficiency was determined to be 98.5% based on the ^{137}Cs isotopic data, for an overall 2-filter efficiency of 99.98% (Note: This 98.5% ^{137}Cs filter efficiency was chosen over the published ANSI N13.1-1999, Annex D value of 99.7 – 99.99% and over the 99.3% total beta efficiency value). This ^{137}Cs filter efficiency was conservatively applied to all sample filter isotopic data to determine an adjusted sample activity. The composite probe rinse results were then added to the composite filter results to account for line losses. The full lab report and data are provided in Attachment 3. The results of the analyses and calculations are summarized as follows:

Composite Sample Filter Laboratory Results and Calculated Results

Radionuclide Isotope	Lab Results ($\mu\text{Ci}/\text{Sa}$)	Adjusted for 98.5% efficiency ($\mu\text{Ci}/\text{Sa}$)
^{137}Cs	3.4 E-2	3.5 E-2
^{90}Sr	7.1 E-2	7.1 E-2
$^{239,240}\text{Pu}$	1.0 E-5	1.0 E-5
Total Beta	1.2 E-1	1.2 E-1
Total Alpha	2.9 E-6	3.0 E-6

Probe Rinse Results

Rinse #	Total Beta ($\mu\text{Ci/mL}$)	Total Alpha ($\mu\text{Ci/mL}$)
1	3.4 E-3	ND
2	1.2 E-4	ND
3	4.7 E-5	ND

Probe Rinse Composite Laboratory Results and Calculated Results

Radionuclide Isotope	Lab Results ($\mu\text{Ci/mL}$)	Result for Total 300 mL Sample ($\mu\text{Ci/Sa}$)
¹³⁷ Cs	4.7 E-4	1.4 E-1
⁹⁰ Sr	3.9 E-4	1.2 E-1
^{239,240} Pu	3.9 E-8	1.2 E-5

Combined Sample Filter and Probe Rinse Composite Results

Radionuclide Isotope	Overall Sample Radioactivity ($\mu\text{Ci/Sa}$)
¹³⁷ Cs	1.8 E-1
⁹⁰ Sr	1.9 E-1
^{239,240} Pu	2.2 E-5

POTENTIAL EMISSIONS ESTIMATE

Air concentrations were measured through representative sampling and analysis. The potential emissions are calculated by multiplying the radionuclide concentrations by the annual discharge volume. The potential offsite dose to the Maximum Public Receptor (MPR) is then calculated by multiplying by unit dose factors, as derived from the CAP88-PC program, documented in HNF-3602-1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. The following is a list of parameters and assumptions used in these calculations:

- Sample flow rate (average of on/off flow rates): 2.35 cfm*
- Sample duration: 3.84 days
- Stack operation: 365 days/yr
- Stack flow: 18,000 scfm**
- Stack height: 90 ft (27.4 m)

Potential Emissions Estimate for Stack 296-B-1

Radionuclide Isotope	Overall Sample Radioactivity ($\mu\text{Ci}/\text{Sa}$)	PTE (Ci/yr)	Unit Dose Factor (mrem/Ci)***	Potential Offsite Dose to the MPR (mrem/yr)
^{137}Cs	1.8 E-1	1.3 E-1	0.24	3.1 E-2
^{90}Sr	1.9 E-1	1.4 E-1	0.11	1.5 E-2
$^{239,240}\text{Pu}$	2.2 E-5	1.6 E-5	8.2	1.3 E-4
			Total Dose:	4.6 E-2

* Sample on/off flow rates were 2.5 cfm and 2.2 cfm. A linear average of 2.35 cfm is conservative considering that the effect of loading on flow rates is typically non-linear.

** Conservative maximum stack flow rate. For this test, the flow rate was measured to be 16,800 scfm.

***The dose factors used for ^{137}Cs and ^{90}Sr include in-grown daughter radionuclide doses.

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ATTACHMENT 1

VELOCITY PROFILE MEASUREMENT
PROCEDURE AND DATA

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1.0 PURPOSE AND SCOPE

This procedure provides a safe, uniform method for obtaining B-Plant duct pitot traverse flow data. Measurements are obtained on a vertical section of the duct upstream of the HEPA filters leading to the stack 296-B-1. Pitot traverses are performed at 1" ports located on the north and east sides of the duct.

This pitot traverse complies with 40 CFR 60, App. A, Method 1 & 2.

2.0 REFERENCES

None.

3.0 PERSONNEL REQUIREMENTS

- 3.1 Vent & Balance (VB) Power Operator and Lead.
- 3.2 Stationary Operating Engineer (SOE), as required.
- 3.3 Radiation Control Technician (RCT), as required.
- 3.4 Cognizant Engineer, Effluents, or representative, as required.

4.0 PRECAUTIONS AND LIMITATIONS

- 4.1 If during performance of this procedure, any of the following conditions are found, stop work, place equipment in a safe condition, and notify Person-In-Charge (PIC) or designee:
 - Any equipment malfunction which could prevent fulfillment of its functional requirements.
 - Personnel error or procedural inadequacy which could prevent fulfillment of procedural requirements.
 - Limiting conditions of applicable RWP are exceeded.
- 4.2 Contact PIC or designee for additional instructions if changing plant conditions affect work or delays are anticipated to extend work past end of shift.
- 4.3 Any Data Sheet Component/Equipment/Item not required for procedure completion shall be indicated as such by:
 - 4.3.1 Entering "N/A" in the appropriate Data Sheet signoff space.
 - 4.3.2 Providing an explanation in the COMMENTS section of the Data Sheet.

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- 4.4 If any waste is generated during performance of this procedure, consult Facility Waste Coordinator for specific instructions to ensure compliance with PHMC and DOE environmental standards, as applicable, for disposal.
- 4.5 Take special care to ensure contamination control when inserting and withdrawing vent and balance equipment.
- 4.6 Additional precautions and limitations as defined in controlling work package.
- 4.7 This is a general compliance procedure. Sections or steps within sections of this procedure may be performed out of sequence as required for maintenance or plant conditions. However, sequencing logic must be maintained as necessary to ensure validity of data, according to craftsman training.

5.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS

NOTE

All Measuring and Test Equipment (M&TE) used to perform this procedure must be within its current calibration cycle as shown on the calibration label.

5.1 Ventilation and Balance instrumentation and equipment including:

- Standard pitot tube
- Manometer or similar airflow equipment, calibrated.
- Hygrometer or other temperature and humidity measuring equipment, calibrated.
- Air source.
- Time piece.
- Calculator.
- Tape Measure.
- Metal foil duct tape, as needed.
- Personnel Protective Clothing (as required)

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6.0 PREREQUISITES

- 6.1 Obtain release from Facility Management or designee prior to beginning performance of this procedure.
- 6.2 Potential for radiological contamination exists. Request RCT to perform appropriate survey(s) prior to beginning maintenance or removal of equipment or component from installed location.
- 6.3 The B-Plant HVAC System is required to be operating in a standard configuration with no zone flow reductions as established by Stationary Operating Engineer.
- 6.4 Ensure Operations personnel or designee can account for configuration of system or equipment as required by Step 6.3, to allow performance of this procedure.
- 6.5 If using this procedure for purposes other than emission measurement air flow testing, Cognizant Engineer may omit requirements for barometric pressure, relative humidity, static pressure, and temperature data. Additional Data Sheets may be needed if repeating air flow tests.
- 6.6 Address additional job-specific prerequisites as required by the controlling work package.

7.0 INSTRUCTIONS

7.1 Complete Preliminary Actions for Testing Air Flow

- 7.1.1 **ENSURE** Pre-requisite conditions of this procedure have been met.
- 7.1.2 **PREPARE** equipment for test.
- 7.1.3 **RECORD** equipment calibration data (Data Sheet 1).
- 7.1.4 IF additional or replacement instrument(s) are used,
THEN **RECORD** calibration data AND **EXPLAIN** in COMMENTS section (Data Sheet 1).

7.2 Obtain Barometric Pressure

- 7.2.1 **CONTACT** Hanford Weather Forecaster by telephone (373-2716).
- 7.2.2 **REQUEST** absolute barometric pressure (P_b) for closest weather station.
- 7.2.3 **VERIFY** location, station number, time and elevation.
- 7.2.4 **RECORD** data on Data Sheet 2.

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7.3 IDENTIFY operating exhaust fan(s) data on Data Sheet 2.

7.4 Perform Pre-Test Leak Check

7.4.1 IF MP20 manometer is used,
THEN ENSURE Density Program is set to 0.000.

7.4.2 BLOW clean, dry air into pitot tube impact hole until manometer reads at least 3.00" w.g.

7.4.3 CLOSE off hole opening AND HOLD for minimum of 15 seconds.

NOTE

Leak check PASSES if manometer reading remains stable (± 0.2 " w.g.) for at least 15 seconds; otherwise, leak check FAILS.

7.4.4 OBSERVE manometer reading AND RECORD results (PASS or FAIL) on Data Sheet 2.

7.4.5 APPLY suction to pitot tube static pressure hole until manometer reads at least 3.00" w.g., AND HOLD for minimum of 15 seconds.

7.4.6 OBSERVE manometer reading AND RECORD results (PASS or FAIL) on Data Sheet 2.

7.4.7 IF leak check fails,
THEN:

7.4.7.1 REPAIR OR REPLACE equipment as required.

7.4.7.2 REPEAT Steps 7.4.2 through 7.4.6.

7.5 Identify Velocity Traverse Site

7.5.1 LOCATE velocity traverse site. See Figure 1.

7.6 Obtain Pitot Traverse Measurements

NOTE

- The velocity traverse site is at ports in diameter for inserting the pitot tube, and are located for 2 tangent traverses.
- Traverse point intervals on Data Sheet are measured relative to stack inner surface.
- The duct internal diameter is 29 1/4" (ID), wall thickness 3/8". Port depth is 1 5/8".

7.6.1 Pitot Tube and Temperature Probe

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- 7.6.1.1 **MARK** pitot tube and temperature probe insertion positions to allow accurate probe positioning during testing using distances indicated on Data Sheet 3 plus 1 5/8" port depth.
- 7.6.2 **MEASURE** relative humidity (RH) in stack air stream, AND RECORD on Data Sheet 3.
- 7.6.3 **MEASURE** static air pressure (P_g) in stack air stream, AND RECORD on Data Sheet 3.
- 7.6.4 Stack Air Velocity Pressure and Temperature
- 7.6.4.1 **MEASURE** velocity pressure (VP) at each traverse point in order shown on Data Sheet 3.
- 7.6.4.2 **MEASURE** stack air temperature (t_s) at each traverse point in order shown on Data Sheet 3.
- 7.6.4.3 **WIPE** pitot tube as it is removed, AND REQUEST RCT to perform removable contamination survey after withdrawing pitot tube from port.
- 7.6.5 **REPEAT** step 7.6.4 for remaining test port(s).
- 7.6.6 **COMPLETE** required information on Data Sheet 3.

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7.7. Verify Pitot Tube Performance

NOTE

If velocity pressure at last traverse point is unsuitably low (less than 0.04" w.g.), then the traverse point with the highest value velocity pressure should be used to verify pitot tube performance.

- 7.7.1 COPY last traverse point measurement from Data Sheet 3 AND ENTER reading as VP₁ on Data Sheet 4.
- 7.7.2 PURGE pitot tube impact and static pressure holes with clean, dry, pressurized air.
- 7.7.3 REPEAT last traverse point measurement AND ENTER reading as VP₂.
- 7.7.4 DETERMINE percent difference (P) between measurements:

$$P = 100 \frac{(VP_1 - VP_2)}{VP_1}$$

- 7.7.5 RECORD results, including PASS/FAIL conclusions, on Data Sheet 4.

NOTE

If percent difference is greater than $\pm 5\%$ but velocity pressure at VP₁ is less than 0.04" w.g., repeating Steps 7.6.3 through 7.7.5 is NOT required. The Cognizant Engineer determines acceptability of VP measurements.

- 7.7.6 IF percent difference is greater than $\pm 5\%$ AND VP₁ is equal to or greater than 0.04" w.g.,
THEN REPEAT Steps 7.6.3 through 7.7.5.

7.8. Perform Post-test Leak Check

- 7.8.1 IF MP20 manometer is used,
THEN ENSURE Density Program is set to 0.000.
- 7.8.2 BLOW clean, dry air into pitot tube impact hole until manometer reads at least 3.00" w.g.

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7.8.3 CLOSE off hole opening AND HOLD for minimum of 15 seconds.

NOTE

Leak check **PASSES** if manometer reading remains stable (± 0.2 " w.g.) for at least 15 seconds; otherwise, leak check **FAILS**.

7.8.4 OBSERVE manometer reading.

7.8.5 APPLY suction to pitot tube static pressure hole until manometer reads at least 3.00" w.g., AND HOLD for minimum of 15 seconds.

7.8.6 OBSERVE manometer reading.

7.8.7 RECORD results on Data Sheet 4.

7.8.8 IF either leak check fails,
THEN REPAIR OR REPLACE equipment as required AND:

7.8.8.1 REPEAT Steps 7.4.1 through 7.4.7.

7.8.8.2 REPEAT Steps 7.6.1 through 7.8.7.

7.9 Removing Test Equipment and Restoring Air System to Operating Configuration

NOTE

- Test Port covers may include caps, plugs, or new metal tape.
- "New" metal foil tape is the ONLY tape authorized for covering test port openings. Use of alternate tape or re-application of used metal tape is not allowed.

7.9.1 ENSURE all test ports are covered, using caps, plugs, or new metal tape, as required.

7.9.2 SURVEY all equipment before removal from work area, as required.

7.10 COMPLETE the following Duct Air Flow Test calculations (both stacks), AND RECORD results on Data Sheet 4:

7.10.1 DETERMINE Total t_s by adding t_s entries on Data Sheet 3.

7.10.2 DETERMINE Average t_s by dividing Total t_s by number of t_s entries on Data Sheet 4.

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- 7.10.3 **CALCULATE** Velocity FPM for each traverse point based on values listed on Data Sheet 4:

$$FPM = 4005 \times \sqrt{VP}$$

- 7.10.4 **DETERMINE** Total FPM by adding FPM entries on Data Sheet 4.
- 7.10.5 **DETERMINE** Average FPM by dividing Total FPM by number of FPM entries on Data Sheet 4.
- 7.10.6 **CALCULATE** Total CFM to determine stack air flow on Data Sheet 4:

$$TOTAL\ CFM = AVERAGE\ FPM \times DUCT\ AREA\ SQ,FT$$

8.0 RESTORATION

- 8.1 Ensure all equipment has been disconnected, removed and equipment staged for restoration to original condition.
- 8.2 Verify port plugs replaced with metal tape, as needed.

9.0 TESTING AND ACCEPTANCE

- 9.1 Note any off-standard conditions or discrepancies under **COMMENTS** on the attached Data Sheets.
- 9.2 Air flow results are acceptable if post-test leak checks PASS and if the effluent engineer determines that the VP measurements are acceptable.

10.0 DISPOSITION

- 10.1 Inform Maintenance and Operations Management maintenance is complete.
- 10.2 Facility PIC shall ensure all caps, plugs, and instrumentation are restored to original configuration. If metal tape was used, then PIC shall ensure new metal tape is used.
- 10.3 Vent & Balance Reviewer ensure Data Sheets are complete, accurate, and legible.
- 10.4 Vent & Balance Reviewer print name, sign, and date Data Sheet 6.
- 10.5 Record Work Request Number(s) of any applicable work documents generated as a result of this instruction.

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- 10.6 Return Work Package to PIC for proper distribution of Work Package and Post Review activities.
- 10.7 Facility PIC or Contact forward work package to Effluent Engineer for completion of required calculations and data analysis.
- 10.8 When calculations are complete, Effluent Engineer signs and dates Data Sheets, and forwards work package to PIC/Job Control, who will ensure distribution of all completed Data Sheets to the required recipients including Ventilation & Balance.

11.0 BIBLIOGRAPHY

- HANFORD WEB, Intranet Resource Center, Policies and Procedures:
 - HNF-PRO-081, "Hazardous Energy Control Program,"
 - HNF-PRO-083, "Personal Protection,"
 - HNF-PRO-088, "Electrical Work Safety,"
 - HNF-PRO-072, "Plant Instrument and Equipment Status labeling."
- HSRCM-1, Hanford Site Radiological Control Manual, Chapter 2, Part 3, "Posting," and Chapter 3, Part 2, "Work Preparation."
- HNF-RD-8703, "Air Quality - Radioactive Emissions."
- CVI: None available as units were Hanford made and are calibrated by PNNL. Information is based on Craft Knowledge of equipment.
- 40 CFR 60, Appendix A, "Test Methods," Methods 1, 1A, 2 and 2C.
- 40 CFR 61, Subpart H.
- WAC 246-247 and Radioactive Air emissions permit FF01.
- HANFORD SITE AIR OPERATING PERMIT #00-05-006.
- DOE/EH-0173T, ENVIRONMENTAL REGULATORY GUIDE.
- 7-GN-166, "Stack Air Flow Test."
- HNF-5173, "Project Hanford Radiological Control Manual."
- HNF-RD-7769, "OSHA Compliance."
- HNF-RD-8635, "Review of Technical Documents."

12.0 ATTACHMENTS

FIGURE 1 - TEST PORT LOCATION

DATA SHEET 1 - CALIBRATION DATA FOR 296-B-1

DATA SHEET 2 - BACKGROUND DATA FOR 296-B-1

DATA SHEET 3 - FLOW MEASUREMENTS FOR 296-B-1

DATA SHEET 4 - DATA COMPLETION FOR 296-B-1

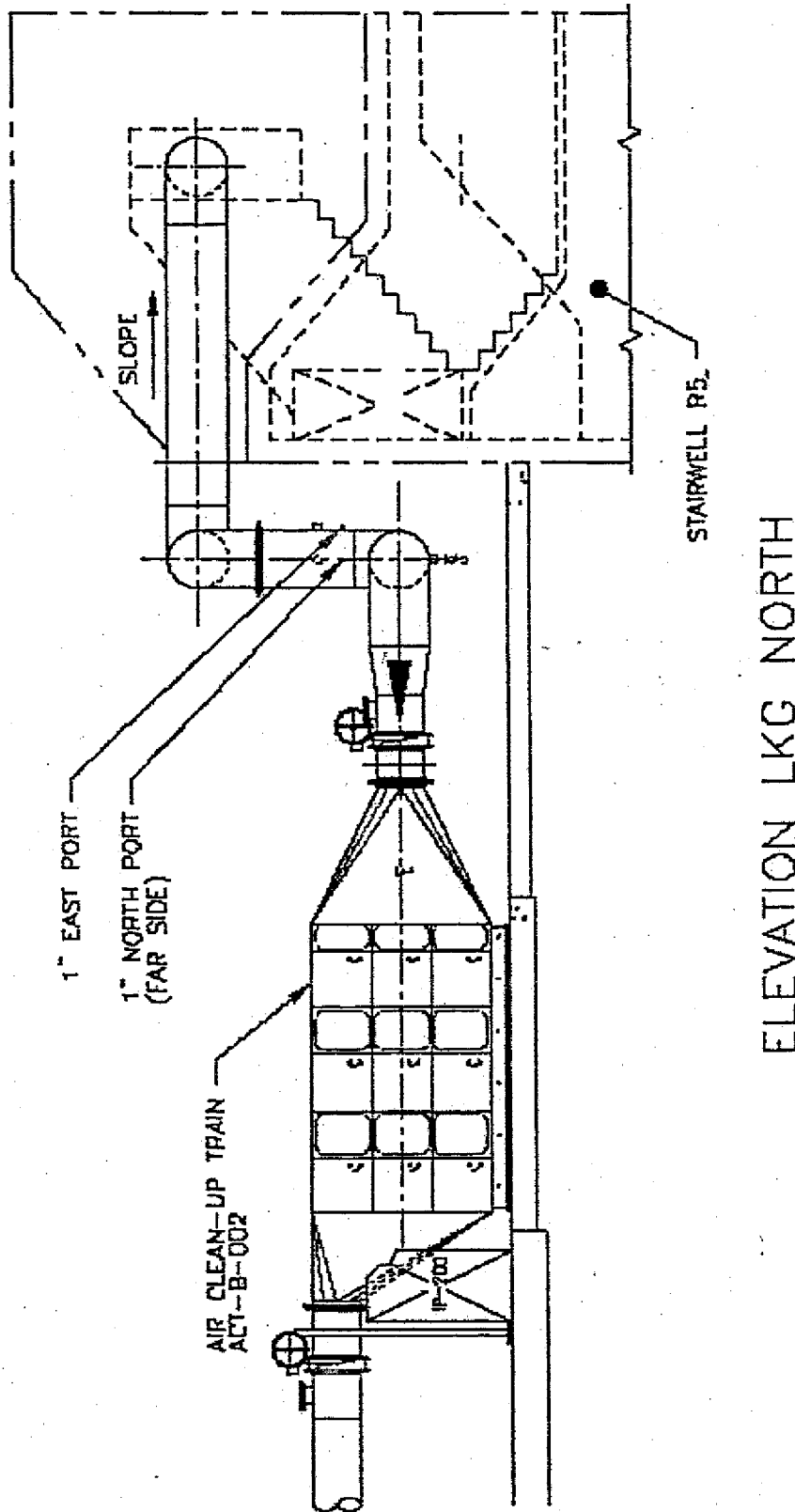
DATA SHEET 5 - CALCULATIONS DATA FOR 296-B-1 (Sheet 1 of 2)

DATA SHEET 5 - CALCULATIONS DATA FOR 296-B-1 (Sheet 2 of 2)

DATA SHEET 6 - DISPOSITION DATA FOR 296-B-1

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FIGURE 1: TEST PORT LOCATION



J4

RESOLUTION/RETEST
B-Plant Air Flow Test

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DATA SHEET 1 - CALIBRATION DATA FOR 296-B-1

STEP #	INSTRUMENT CALIBRATION DATA	
7.1.3	AIR FLOW INSTRUMENT	HYGROMETER OR OTHER TEMPERATURE AND HUMIDITY MEASURING EQUIPMENT
	Flow Instrument Type <i>Micro</i>	Equipment Number <i>7-24-03</i> <i>79900017018</i>
	HSL Code Number <i>702-28-09-019</i>	HSL Code Number <i>799-28-01-010</i>
	HSL Cal Due Date <i>1-20-04</i>	HSL Cal Due Date <i>5-21-04</i>
7.1.4	ADDITIONAL INSTRUMENT CALIBRATION DATA	
	COMMENTS:	

fic, 7-24-03
 Initials/Date

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DATA SHEET 2 - BACKGROUND DATA FOR 296-B-1

STEP #	BAROMETRIC PRESSURE READING				
7.2.1	Hanford Weather Forecaster (373-2716)				
7.2.4	Location	Station Number	Elevation (ft)	Time of Reading	Barometric Pressure (in. Hg)
	B-Plant	6	680 ft above MSL	0840	29.130 (P _b)
	COMMENTS:				
STEP #					
7.3	Operating exhaust fan(s):			EF-1	
7.4	PRE-TEST LEAK CHECK				
7.4.4 7.4.6	[Reading \geq 3.0 in. wg and stable (\pm 0.2 in. wg) for 15 sec.]				<div style="border: 1px solid black; border-radius: 50%; padding: 5px; text-align: center;">PASS/ FAIL</div>
	(7.4.4) Impact Pressure 5.12" wg (7.4.6) Static Pressure 7.64" wg				
COMMENTS:					

du 17-24-03
Initials / Date

J4**RESOLUTION/RETEST
B-Plant Stack Air Flow Test****CP-03-00037/P
Page 13 of 17****DATA SHEET 3 - FLOW MEASUREMENTS FOR 296-B-1**

STEP #	STACK AIR FLOW MEASUREMENTS, 296-B-1							
7.6.1	Port depth 1 5/8 inches (1 1/4" plus 3/8" wall thickness) added to traverse points.							
7.6.2	Relative Humidity: <u>78</u> % (RH)							
7.6.3	Static Pressure: <u>-3.20</u> "w.g. (P _g)							
7.6.4	Traverse Point No.	Distance from inside duct wall (inches)	Temperature and Velocity					
7.6.5			North Port <u>(A)</u>			East Port <u>(B)</u>		
			t _s (°F)	VP ("w.g.)	FPM* (ft/min)	t _s (°F)	VP ("w.g.)	FPM* (ft/min)
	1	1	65	.61	3128	65	.93	3862
	2	3 1/8	65	.62	3154	65	.99	3985
	3	5 5/8	65	.62	3154	65	1.01	4025
	4	9 1/2	65	.68	3303	65	.97	3944
	5	19 3/4	65	.93	3862	65	.72	3398
	6	23 5/8	65	1.04	4084	65	.70	3351
	7	26 1/8	65	1.10	4200	65	.76	3491
	8	28 1/4	65	1.13	4257	65	1.85	3692
			TOTAL FPM <u>29142</u>			TOTAL FPM <u>29748</u>		

* FPM = 4005 √VP

Time test completed: 0900SL 7-24-03
Initials/Date

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DATA SHEET 4 - DATA COMPLETION FOR 296-B-1

STEP #	PITOT TUBE PERFORMANCE CHECK							
7.7.1 7.7.3 7.7.4 7.7.5	<p>(PASS = $P \leq \pm 5\%$; FAIL = $P > \pm 5\%$)</p> <p>$P = [(\underline{.85} - \underline{.85}) + \underline{.35}] \times 100 = \underline{0} \%$</p> <p>VP1 VP2 VP1</p> <p>If $P > \pm 5\%$ AND VP1 < 0.04 in. wg, air flow retest is NOT required; COG Engineer will determine acceptability of pitot tube performance.</p>	PASS/FAIL						
COMMENTS:								
POST-TEST PRESSURE LEAK CHECK								
7.8.4 7.8.6	<p>[Reading ≥ 3.0 in. wg and stable (± 0.2 in. wg) for 15 sec.]</p> <p>(7.8.4) Impact Pressure <u>5.30"wg</u> (7.8.6) Static Pressure <u>4.58"wg</u></p>	PASS/FAIL						
COMMENTS:								
STACK AIR FLOW CALCULATIONS								
7.10.1	Total $t_s = t_{s1} + t_{s2} + t_{s3} + \dots$	<table border="1"> <tr> <td>Total Port A</td><td><u>520</u> (Sht 3)</td></tr> <tr> <td>Total Port B</td><td><u>520</u> (Sht 3)</td></tr> <tr> <td>Total t_s (A + B)</td><td><u>1040</u></td></tr> </table>	Total Port A	<u>520</u> (Sht 3)	Total Port B	<u>520</u> (Sht 3)	Total t_s (A + B)	<u>1040</u>
Total Port A	<u>520</u> (Sht 3)							
Total Port B	<u>520</u> (Sht 3)							
Total t_s (A + B)	<u>1040</u>							
7.10.2	Average $t_s = \text{Total } t_s \div 16$	t_s (avg) <u>65</u>						
7.10.3	Velocity FPM = $4005 \sqrt{VP}$	Data Sheet 3						
7.10.4	Total FPM = FPM1 + FPM2 + FPM3 + ...	<table border="1"> <tr> <td>Total Port A</td><td><u>29142</u> (Sht 3)</td></tr> <tr> <td>Total Port B</td><td><u>29748</u> (Sht 3)</td></tr> <tr> <td>Total FPM (A + B)</td><td><u>58890</u></td></tr> </table>	Total Port A	<u>29142</u> (Sht 3)	Total Port B	<u>29748</u> (Sht 3)	Total FPM (A + B)	<u>58890</u>
Total Port A	<u>29142</u> (Sht 3)							
Total Port B	<u>29748</u> (Sht 3)							
Total FPM (A + B)	<u>58890</u>							
7.10.5	Average FPM = Total FPM $\div 16$	FPM (avg) <u>3681</u>						
7.10.6	Total CFM = Average FPM $\times 4.67$ sq ft	cfm (total) <u>17190</u>						

Luc 17-24-03
Initials / Date

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DATA SHEET 5 - CALCULATIONS FOR 296-B -1 (Sheet 1 of 2)

COGNIZANT ENGINEER CALCULATION WORKSHEET		
AVERAGE ACTUAL STACK GAS VELOCITY (v_s)		
$v_s = K_p C_p \left(\sqrt{VP} \right)_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}}$		
Eq. Input	Description	Value
K_p	Pitot tube constant: $85.49 \frac{ft}{sec} \left[\frac{(lb)(in. Hg)}{(lb-mole)^\circ R (in. H_2O)} \right]^{\frac{1}{2}}$	85.49
C_p	Pitot tube coefficient, standard	0.99
FPM (avg)	Average stack gas velocity, ft/min	3681 (Sht 4)
$(\sqrt{VP})_{avg}$	Average of velocity pressure sq rt, in. wg: $(\sqrt{VP})_{avg} = FPM_{avg} \div 4005$.9191
$t_s (avg)$	Average stack gas temperature, °F	65 (Sht 4)
$T_s (avg)$	Average absolute stack temperature, °R $T_{s(avg)} = 460 + t_{s(avg)}$	525
P_b	Barometric pressure at test port, in. Hg	29.130 (Sht 2)
P_g	Stack static pressure, in. wg	-3.20 (Sht 3)
P_s	Absolute stack gas pressure, in. Hg: $P_s = P_b + (P_g \div 13.6)$	28.89
M_s	Molecular weight stack gas, dry, lb/lb-mole:	29
CALCULATION (V_s) $V_s = 85.49 (.99) (.9191) \sqrt{\frac{525}{28.89 (29)}} = 61.577$ $ (= 3695 fpm)$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto;"> $V_s = 61.58 \text{ ft/sec}$ </div>		

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DATA SHEET 5 - CALCULATIONS FOR 296-B -1 (Sheet 2 of 2)

COGNIZANT ENGINEER CALCULATION WORKSHEET

AVERAGE STACK GAS DRY VOLUMETRIC FLOW RATE (Q_{sd})

$$Q_{sd} = 60V_s A \left(\frac{T_{std}}{T_{avg}} \right) \left(\frac{P_s}{P_{std}} \right)$$

Eq. Input	Description	Value
A	Cross-sectional stack area, ft ²	4.67
T _{std}	Standard absolute temperature, °R	528
P _{std}	Standard absolute pressure, in. Hg	29.92

CALCULATION (Q_{sd})

$$60(61.58)(4.67) \cdot \frac{528}{525} \cdot \frac{28.89}{29.92} = 16,756$$

 $Q_{sd} =$ dscfm

16,800

DH, 10-9-03
COG Engr Initials / Date

J4	RESOLUTION/RETEST B-Plant Stack Air Flow Test	CP-03-00037/P Page 17 of 17
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DATA SHEET 6 – DISPOSITION FOR 296-B -1

STEP #	DISPOSITION
10.2	<p>Facility Person-In-Charge (PIC) shall ensure all caps, plugs, and instrumentation have been restored to original configuration.</p> <p>System configuration Restored: Facility PIC <i>[Signature]</i> Date 7/24/03</p>
10.3 10.4	<p>Vent & Balance reviewer shall ensure Data Sheets are accurate, complete, and legible.</p> <p>S. Barrett <i>[Signature]</i> 7/24/03 V&B Review (print name) Signature Date</p>
10.5	<p>Facility Person-In-Charge (PIC) shall record Work Request Number of items requiring additional maintenance:</p> <p>NA Work Request Number Facility PIC <i>[Signature]</i> Date 7/24/03</p>
10.7 10.8	<p>Facility PIC forward work package to Cognizant Engineer for effluent and emissions calculations (Cog. Engr. sign when complete & return work package to PIC/Job Control):</p> <p>D.L. Johnson <i>[Signature]</i> 10-9-03 Cog. Engr. (print name) Signature Date</p>
COMMENTS:	

ATTACHMENT 2

**SAMPLING PROCEDURE, INSPECTION REPORTS
AND CHAIN-OF-CUSTODY**

J-4	RESOLUTION/RETEST B-PLANT UPSTREAM AIR SAMPLING	CP-03-151/W PAGE 1 OF 12
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1.0 SCOPE

- 1.1 Air sampling will be performed upstream of the exhaust HEPA filters to provide information that will be used to accurately verify B-Plant stack designation. This will involve the following activities, by section:

- 6.1 FABRICATION OF SAMPLE PROBE
- 6.2 ASSEMBLY OF SAMPLING INSTRUMENT CABINET
- 6.3 SAMPLE FILTER PREPARATION AND INITIAL DOCUMENTATION
- 6.4 INSTALLATION OF SAMPLING EQUIPMENT
- 6.5 OPERATION OF SAMPLER
- 6.6 DAILY INSPECTION OF SAMPLING SYSTEM
- 6.7 SAMPLE AND PROBE REMOVAL FOR LABORATORY ANALYSIS
- 6.8 RESTORATION

This procedure is to be used repeatedly for the daily checks. Additional Sampling System Inspection Report sheets and COCs may be added as needed. Steps may be repeated as necessary to obtain the required samples, as determined by the Effluent Engineer. Sample duration will be designated by the Effluent Engineer. Sample flow rate may be re-designated by the Effluent engineer.

2.0 SPECIAL TOOLS, EQUIPMENT, AND MATERIALS

- Calibrated rotameter, 40-400 scfh.
- Vacuum gage, 0-30" Hg
- Sample filter holders, flow control valve, vacuum pump, sample cabinet, miscellaneous pipe, tubing, hose, fittings, as required.
- Black ink pen
- Sample envelopes
- Plastic bag
- Gelman Versapore 3000 T W/WA Filter Papers

3.0 REFERENCES

- 3.1 Engineering Sketch
- 3.2 Attachment 1 - Pressure Correction Chart
- 3.3 Attachment 2 - Sampling System Inspection Report
- 3.4 Attachment 3 - B-Plant Upstream Air Sample Chain-of-Custody
- 3.5 Attachment 4 - Vacuum Gage Calibration Instruction

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4.0 PRECAUTIONS/LIMITATIONS

- 4.1 Observe the appropriate RWP and plant area entry requirements.
- 4.2 If during performance of this procedure, any of the following conditions are found, stop work, place equipment in a safe condition, and notify Effluent Engineer and Radiological Control Supervisor:
 - Any equipment malfunction that could prevent fulfillment of its functional requirements.
 - Personnel error or procedural inadequacy that could prevent fulfillment of procedural requirements.
- 4.3 In the event of an emergency, call 911, then the Facility Point-of-Contact at 528-1350.
- 4.4 Sampler is required to be inspected daily. Each inspection has four objectives, as listed below:
 - Check sampler operation
 - Document sampler inspection observations
 - Adjust operating parameters as necessary
 - Notify Effluent Engineer of problems
- 4.5 The contaminated duct is under negative pressure, so it draws in air when opened for confinement of radionuclides. Utilize the same radiological control measures as routinely performed during aerosol and air flow tests.

5.0 PREREQUISITES

- 5.1 Ensure that the rotameter and vacuum gage have been calibrated prior to installation. Ensure copies of calibration certification and data sheets are included in the work package.
- 5.2 Personnel Requirements
 - RCT support is required throughout to ensure radiological control, and nuclear operators as required. Pipe Fitter/ Instrument Tech required for fabrication, assembly and installation. Sample preparation, sampler operation and daily inspection are performed by an RCT. Probe removal and restoration requires a pipe fitter.

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6.0 INSTRUCTIONS

NOTE:

This procedure is to be used repeatedly for the daily checks. Additional Sampling System Inspection Report sheets and COCs may be added as needed. Steps 6.1 – 6.3 may be performed in parallel. Steps may be repeated as necessary to obtain the required samples, as determined by the Effluent Engineer. Record any comments in the craft log.

6.1 FABRICATION OF SAMPLE PROBES

- 6.1.1 Fabricate air sample probe according to engineering sketch. Ensure a 5-diameter radius bend, as measured from center of tubing. Sharpen exterior nozzle tip.
- 6.1.2 Fabricate/assemble probe mountings according to engineering sketch.

6.2 ASSEMBLY OF SAMPLING INSTRUMENT CABINET

- 6.2.1 Calibrate vacuum gage using Attachment 4.
- 6.2.2 Assemble a vacuum gage, rotameter, flow control valve, vacuum pump, pipe/tube/hose and fittings into sampling cabinet according to engineering sketch layout. Install suction and exhaust hoses, fittings, and sample filter holders.

6.3 SAMPLE FILTER PREPARATION AND INITIAL DOCUMENTATION

- 6.3.1 Prepare air sample filter Gelman Versapore-3000 T W/WA using the following Numbering system.

SAMPLE NUMBER DESIGNATION

Sample Point Identification: 296-B-1 Upstream

Sample Number: 1 (primary) & 2 (secondary)

- 6.3.2 Record sample point identification, sample number and "on" date on the outside edge of the sample filter.
- 6.3.3 Ensure air sample filter envelope is labeled with following information:
 - Sample Point Identification (i.e. 296-B-1 Upstream)
 - Sample Number

J-4	RESOLUTION/RETEST B-PLANT UPSTREAM AIR SAMPLING	CP-03-151/W PAGE 4 OF 12
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6.3.4 Ensure current date is recorded on the Sampling System Inspection Report (Attachment 2).

6.3.5 Ensure rotameter and vacuum gauge identifications and expiration dates are correctly recorded on Inspection Report.

6.4 INSTALLATION OF SAMPLING EQUIPMENT

6.4.1 Place sampling instrument cabinet near the intended sampling location, as identified in engineering sketch. Ensure the flow control valve is shut.

6.4.2 Remove plug from the 1" north port, place in bag for disposal, have HPT survey gloves and install exhaust hose onto duct, as identified in engineering sketch.

6.4.3 Insert labeled sample filters into sample filter holders.

6.4.3.1 Ensure sample filter support screen is in place, and check condition of o-ring on sample holder.

6.4.3.2 Place new, labeled, air sample filter in sample holder.

6.4.3.3 Close and ensure all components of sample holder are hand-tight.

6.4.4 Attach sample probe to sample filter holders.

6.4.5 Ensure all connections are tight, with exception of probe mount slide connection.

6.4.6 Remove plug from the duct 1" east port for sample probe installation, as identified in engineering sketch, and place in bag for disposal. Have HPT survey gloves.

6.4.7 Clean any debris from port.

NOTE:

To ensure a representative sample, it is important to avoid scraping the probe nozzle on any potentially contaminated internal duct or port surfaces.

6.4.8 Install sample probe into duct:

6.4.8.1 Carefully insert probe into port to the position as indicated in engineering sketch, with nozzle facing directly into the air flow. Ensure nozzle tip does not scrape any port or duct surfaces, to prevent sample contamination.

6.4.8.2 Tighten the probe mount slide connection.

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6.5 OPERATION OF SAMPLER

- 6.5.1 Open flow control valve.
- 6.5.2 Start vacuum pump.
- 6.5.3 Using vacuum gage and Attachment 1 (Pressure Correction Chart), adjust sample flow control valve to obtain the desired rotameter indication for the required sample flow rate of 2.5 scfm, or as designated by the effluent engineer.
- 6.5.4 Document the required sample flow rate of 2.5 scfm, or as designated by the effluent engineer, on the Inspection Report.
- 6.5.5 Record final rotameter and vacuum gage readings and actual flow rate and start time on Inspection Report and sample envelopes.

6.6 DAILY INSPECTION OF SAMPLING SYSTEM

- 6.6.1 Perform general sampler system check:
 - 6.6.1.1 Inspect for proper configuration, no loose, or damaged components.
 - 6.6.1.2 Check rotameter tube, and float for debris (e.g., oil, dirt, or foreign matter).
- 6.6.2 Record as-found readings from rotameter and vacuum gage.
- 6.6.3 Perform flow rate adjustments as needed:
 - 6.6.3.1 Determine actual flow from Pressure Correction Chart, See Attachment 1.
 - 6.6.3.2 Compare actual flow to Expected Flow Rate of 2.5 scfm.
 - 6.6.3.3 Adjust flow control valve to achieve Expected Flow Rate.
 - 6.6.3.4 If unable to achieve desired flow rate, then document problems in "Comments" section of Inspection Report, continue inspection and notify Effluent Engineer.
 - 6.6.3.5 Record as-left readings on Inspection Report.
 - 6.6.3.6 Record results of system check on Inspection Report. Document problems in "Comments" section.
 - 6.6.3.7 Ensure RCT Signature and HID # is recorded on Inspection Report.

6.7 SAMPLE AND PROBE REMOVAL FOR LABORATORY ANALYSIS

- 6.7.1 Ensure sampler daily inspection has been performed per Section 6.6 of this procedure.
- 6.7.2 Note the time, and shut off vacuum pump. This is the sample "off" time.
- 6.7.3 Carefully remove probe from port, ensuring nozzle tip does not contact the inner duct or port surfaces, to prevent contamination of sample. Remove probe by

J-7	RESOLUTION/RETEST	CP-03-151/W
	B-PLANT UPSTREAM AIR SAMPLING	WCN #1 PAGE 1 OF 2

pulling it through a damp cloth to remove any external contamination, and enclose in plastic sleeve. Plug probe nozzle with tape to contain contamination. Have HPT survey gloves and probe.

- 6.7.4 Plug east port with new plug. ~~Plug primary sample holder until next use.~~ *DDZ 9/19/03, SH 9-14-03 AWS DW 2 9/15/0*
- 6.7.5 Disconnect between primary and secondary sample holders, leaving the probe and primary sample holder intact. *PLUG/TAPE PRIMARY SAMPLE HOLDER/TUBING, DDZ 9/19/03, SH 9-14-03 AWS DW 2 9/15/0*
- 6.7.6 Remove secondary air sample filter from second sample holder, take a direct survey measurement, then place filter in air sample envelope. (Note: This secondary filter provides assurance that the downstream sampling equipment has not been contaminated by the sampling).
- 6.7.7 Record "off" rotameter flow and vacuum readings on secondary sample filter envelope.
- 6.7.8 Record date/time "off" on sample filter envelope.
- 6.7.9 Record signature and Payroll Number on envelope.
- 6.7.10 Fill out COC form as follows:
- Date and Time on
 - Date and Time off
 - On Flow Rate and Vacuum Readings
 - Off Flow Rate and Vacuum Readings
 - Comments
- 6.7.11 Sign and enter HID on the COC form at the "Sample Collected By" line.
- 6.7.12 Perform survey of sample container for shipment.
- 6.7.13 Package probe/primary sample for shipping to the laboratory. Consult S&M Waste Specialist for packaging and shipping instructions.
- 6.7.14 Transport samples to the laboratory immediately.
- 6.7.15 Obtain copy of COC form, documenting laboratory receipt, and place copy in the work package.

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6.8 RESTORATION

Restoration may be performed upon completion of 6.7.6.

*A: JME 9/19/03
WS RWE 7/15/03*

- 6.8.1 Disconnect sampling system exhaust from the north port. (Remove the fitting from sampling exhaust system, and store separately if contaminated, or per RadCon direction, to ensure equipment is releasable for use elsewhere). Store all components for future re-use.
- 6.8.2 Plug north port with new plug.
- 6.8.3 Relocate sampling system, as required.
- 6.8.4 Clean up any construction debris associated with the job and properly dispose in the appropriate waste receptacle. Contact waste management personnel for guidance as required.

7.0 RETEST

- 7.1 Repeat steps as necessary to obtain the required samples, as determined by the Effluent Engineer. Additional Sampling System Inspection Report sheets and COCs may be added, as needed. Record any comments in the craft log.

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RESOLUTION/RETEST
B-PLANT UPSTREAM AIR SAMPLING

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ATTACHMENT 1

PRESSURE CORRECTION CHART FOR DWYER 40 TO 400 SCFH ROTAMETER
CALIBRATED AT STANDARD CONDITIONS * WITH ACTUAL FLOW IN UNITS OF SCFM

FLOW READING (SCFH)	INDICATED VACUUM ON GAUGE (INCHES Hg)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
40	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5
45	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5
50	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
55	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6
60	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7
65	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8
70	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8
75	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9
80	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	0.9
85	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0
90	1.5	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1
95	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1
100	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2
105	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.2
110	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.3	1.3
115	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.4	1.4	1.4
120	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.4
125	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.6	1.6	1.5	1.5
130	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.5
135	2.2	2.2	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6
140	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.6
145	2.4	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7
150	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.8
155	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9	1.8
160	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.0	1.9	1.9
165	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.1	2.1	2.0	1.9
170	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.0
175	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.1	2.1
180	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.1
185	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.2	2.2
190	3.1	3.1	3.0	2.9	2.9	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.2
195	3.2	3.1	3.1	3.0	3.0	2.9	2.8	2.8	2.7	2.7	2.6	2.5	2.4	2.4	2.3
200	3.3	3.2	3.2	3.1	3.0	3.0	2.9	2.9	2.8	2.7	2.7	2.6	2.5	2.4	2.4
205	3.4	3.3	3.2	3.2	3.1	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.4
210	3.4	3.4	3.3	3.3	3.2	3.1	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5
215	3.5	3.5	3.4	3.3	3.3	3.2	3.1	3.1	3.0	2.9	2.8	2.8	2.7	2.6	2.5
220	3.6	3.5	3.5	3.4	3.3	3.3	3.2	3.1	3.1	3.0	2.9	2.8	2.8	2.7	2.6

* Standard Conditions: Pressure= 29.92 " Hg ; Temperature = 70 Degrees F.

Pressure Correction calculation from DWYER: $Q_2 = Q_1/60 \cdot \text{SQRT}((29.92-P_2)/29.92)$

J-4	RESOLUTION/RETEST B-PLANT UPSTREAM AIR SAMPLING	CP-03-151/W PAGE 9 OF 12
-----	--	-----------------------------

ATTACHMENT 2

SAMPLING SYSTEM INSPECTION REPORT

Sample Point ID	Rotameter ID	Rotameter Expiration	Vacuum Gage ID	Vacuum Gage Expiration	Expected Flow Rate
296-B-1 Upstream	276-28-03-002	9-2-04	2A0327	9-4-03	2.5

Date/Time	Rotameter As Found Reading	Vacuum As Found Reading	Actual As Found Flow	Rotameter As Left Reading	Vacuum As Left Reading	Actual As Left Flow	System Check		RCT Signature/HID #
9-15-03	165	5	2.5	165	5	2.5	Satisfactory	Unsatisfactory	RH 1/6A857
9-16-03	160	5.2	2.4	165	5.2	2.5	Satisfactory	Unsatisfactory	RH 1/6A857
9-17-03	160	6	2.4	165	6	2.5	Satisfactory	Unsatisfactory	RH 1/6A857
9-18-03	162	6.5	2.4	170	7	2.5	Satisfactory	Unsatisfactory	RH 1/6A857
9-19-03	140	9.0	2.0	170	7.0	2.2	Satisfactory	Unsatisfactory	RH 1/6A857
							Satisfactory	Unsatisfactory	
							Satisfactory	Unsatisfactory	
							Satisfactory	Unsatisfactory	
							Satisfactory	Unsatisfactory	

Comments: 09-19-03 1026 0955 hr. Vac. pump was shut down and sample was removed from system

J-7	RESOLUTION/RETEST	CP-03-151 /W
	B-PLANT UPSTREAM AIR SAMPLING	WCN #1
		PAGE 2 OF 2

ATTACHMENT 3

B-Plant

UPSTREAM AIR SAMPLE CHAIN-OF-CUSTODY

Company: FH

Company Contact: Dan Johnson, 373-4209

Analysis Request: Gross Alpha/Beta on each individually (primary, secondary, and probe rinses), then combine all for GEA, Sr-90, Pu isotopic, Am-241.

Sample Number	Sample Point ID	On		Off		On Flow Rate (scfm)	Off Flow Rate (scfm)	Comments
		Date	Time	Date	Time			
1	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	2.5	2.2	N/A
2	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	2.5	2.2	N/A
Probe	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	N/A	N/A	Decon probe and filter holder for re-use. Include this as part of the probe sample.

Sample Collected By: [Signature] / [Redacted]
Signature HID#

Relinquished By: [Signature] / [Redacted] Date: 9-19-03 Time: 1156
Signature HID#

Received By: [Signature] / [Redacted] Date: 9/19/03 Time: 11:56
Signature HID#

Relinquished By: [Signature] / [Redacted] Date: _____ Time: _____
Signature HID#

Received By: [Signature] / [Redacted] Date: _____ Time: _____
Signature HID#

Relinquished By: [Signature] / [Redacted] Date: _____ Time: _____
Signature HID#

LABORATORY

FINAL SAMPLE DISPOSAL METHOD: _____ By: _____ Date: _____ Time: _____
Signature

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2-10

J-4	RESOLUTION/RETEST B-PLANT UPSTREAM AIR SAMPLING	CP-03-151/W PAGE 11 OF 12
-----	--	------------------------------

ATTACHMENT 4**VACUUM GAGE CALIBRATION INSTRUCTION**

1. Connect test vacuum source.
2. Vary test input vacuum values as specified on Data Sheet, and record corresponding output values in as-found column of Data Sheet.

NOTE:

If gauge is found out of correctable tolerance, it will be replaced with an approved gage per Design Authority's direction.

3. If as-found output values are within output tolerance range specified by Data Sheet, then record as-found values in as-left column, and proceed to step 5.
4. If as-left values are not within output tolerance range specified by Data Sheet then replace with a calibrated and equivalent gage and notify Design Authority.
5. Apply calibration labels, as required.
6. Gage is ready for installation.

J-4

 RESOLUTION/RETEST
 B-PLANT UPSTREAM AIR SAMPLING

 CP-03-151/W
 PAGE 12 OF 12

CALIBRATION DATA SHEET

 INPUT RANGE 0 to 30 " Hg.
 OUTPUT RANGE 0 to 30 " Hg.
 INPUT M&TE TOLERANCE 0.15 " Hg.
STANDARD 815-31-05-004EXPIRATION DATE 8.14.04TOLERANCE ± 0.2

DATA:

INPUT VALUE OUTPUT VALUE LOW LIMIT UPPER LIMIT AS-FOUND AS-LEFT

4	4	2.5	5.5	<u>4.1</u>	<u>4.1</u>
12	12	10.5	13.5	<u>12.1</u>	<u>12.1</u>
20	20	18.5	21.5	<u>20</u>	<u>20.0</u>



Standards Laboratory

Plant Support Facility
MED 1025, PO Box 968
Richland, WA 99352-0968
Phone (509) 377-8603 FAX (509) 377-8219

Certificate of Calibration

Manufacturer: DWYER
Description: FLOWMETER
Report Number: 1062509711
Release Number:
Customer / MSIN: MCCOLLUM CR - WIPP-CP / R3-30

Model: RMC-104
Asset Number: 776-28-03-002
Serial Number: N/A-2A631 45.5
Ref. Number: 03-01759
Building: 2620W

CALIBRATION INFORMATION

Test Conditions:

Receive Date: 2-Sep-03
Calibration Date: 2-Sep-03
Calibration Due: 2-Sep-04
Technician: P. J. Rumbelow

Procedure / Rev: 24-33 Rev. 0.1
Temperature: 73.0 F
Humidity: 42 %

Test Results:

Pass: Y
Incomplete: N
Limited: N
As Found: PASS
As Left: PASS

Remarks:

STANDARDS USED FOR CALIBRATION

Asset Number	Manufacturer	Model	Description	Calibration Date	Due Date
0063116	OMEGA	UNKNOWN	NOZZLE TEMP MONITOR	5/1/2003	5/1/2004
0063060	OMEGA	UNKNOWN	UUT TEMP MONITOR	5/1/2003	5/1/2004
001-80-02-001	MENSOR	601C	NOZZLE PRESSURE X-DUCER 0-150 PSI	3/5/2003	3/5/2004
001-80-02-002	SETRA	270	UUT PRESSURE X-DUCER	3/5/2003	3/5/2004
001-28-06-002	COX INSTR. CO	0.044	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-28-06-003	COX INSTR. CO.	0.062	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-28-06-004	COX INSTR. CO.	0.088	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
002-32-07-003	OMEGA	CT435B	HYGROTHERMOGRAPH	5/6/2003	5/6/2004

Notes/General Conditions:

The standards and calibration program of the Energy Northwest Standards Laboratory complies with the requirements of 10 CFR50 Appendix B and ANSI/NCSL Z-540-1.

Unless otherwise noted:

The standards used in this calibration, described in the referenced calibration procedure with associated uncertainties or tolerances, are traceable to the National Institute of Standards and Technology (NIST). The total uncertainties or tolerances of the standards used are no greater than 25 % of the tolerance of the unit tested. There are no special limitations of use imposed on this item.

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FEB-12-04 14:01 ENERGY NORTHWEST



Standards Laboratory Calibration Results Report

Report of Calibration Traceable to the National Institute of Standards and Technology (NIST)

Cal Code/ ID# 776-28-03-002	Manufacturer: DWYER	Model: RMC-104	Serial No. 27 0631 4513 N/A
Procedure/Revision: 24-38 0.1	Performed by: P. J. Rumbelow	Condition F/L: FOUND-LEFT	Result: PASS
Temperature 73.0 F	Humidity: 42 %	Cal Date 9/2/2003	Due Date: 9/2/2004
Remarks:			

Standards Used

Asset	Mfg	Model	Description	Cal. Date	Due Date
0663116	OMEGA	UNKNOWN	NOZZLE TEMP MONITOR	5/1/2003	5/1/2004
0063060	OMEGA	UNKNOWN	UJT TEMP MONITOR	5/1/2003	5/1/2004
001-80-02-001	MENSOR	6010	NOZZLE PRESSURE X-DUCER 0-150 PSI	3/5/2003	3/5/2004
001-30-02-002	SETRA	270	UJT PRESSURE X-DUCER	3/5/2003	3/5/2004
001-23-06-002	COX INSTR. CO.	0.044	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-23-06-003	COX INSTR. CO.	0.052	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
001-23-06-004	COX INSTR. CO.	0.088	SONIC FLOW NOZZLE	10/24/2001	10/24/2006
002-32-07-003	OMEGA	CT485B	HYGROTHERMOGRAPH	5/6/2003	5/6/2004

Test Data

TEST#	STD PARAMETER	TRUE VALUE	READING	UNIT UNDER TEST TOLERANCE	UUT ERROR	ERROR in (% of Tol)	NOTI TUR USE
1	80.00_SCFHz	83.190	79.21	8_SCFH	-3.9828732	50	
2	160.00_SCFHz	161.010	158.41	8_SCFH	-2.595746_SCFHz	32	
3	240.00_SCFHz	238.992	237.62	8_SCFH	-1.370619_SCFHz	17	
4	320.00_SCFHz	315.684	316.83	8_SCFH	1.144507_SCFHz	14	
5	400.00_SCFHz	399.012	396.04	8_SCFH	-2.976366_SCFHz	37	

TURs < 4:1 are reported under TUR in the Test Data .

Verification Completed

End of Test Data

Reviewed By: *[Signature]*

Date: *9/2/03*

Tested By: *[Signature]*

Date: *9-2-03*

Report Number: 1062309714

Model: RMC-104 Cal Code: 776-28-03-002 S/N: N/A
Calibrated on: 9/2/2003 at 13:35:11

ORIGINAL

Page 2 of 4

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ATTACHMENT 3

LABORATORY REPORT;
SAMPLE ANALYSIS RESULTS

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author

Harold L. Baker
373-6979
K. M. Hall
376-5029

Addressee

D. L. Dyekman, FH

Correspondence No.

CH2M-0304715
December 9, 2003

Subject:

FINAL LETTER REPORT FOR THE 296-B-1 AIR SAMPLER PROBE AND
FILTERS

DISTRIBUTION

Approval	Date	Name	
		CH2M HILL Correspondence Control	H6-08
		<u>CH2M HILL Hanford Group, Inc.</u>	
		H. L. Baker	T6-12
		K. M. Hall	T6-12
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		K. L. Powell	T6-04
		J. R. Prilucik	T6-12
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		C. M. Seidel	T6-14
		Project Files	T6-12
		APM LB/File	
		<u>Fluor Hanford Inc.</u>	
		D. L. Johnson	L1-05
		L. P. Diediker	H8-13

J. R. Prilucik 12-9-03



CH2MHILL
Hanford Group, Inc.

CH2M HILL
Hanford Group, Inc.
P.O. Box 1500
Richland, WA 99352

December 9, 2003

CH2M-0304715

Mr. Dale L. Dyekman, Environmental Engineer
Monitoring and Reporting
Fluor Hanford Inc.
Post Office Box 1000
Richland, Washington 99352

Dear Mr. Dyekman:

FINAL LETTER REPORT FOR THE 296-B-1 AIR SAMPLER PROBE AND FILTERS

- References:
1. Letter, R. W. Schroeder, CH2M HILL, to D. L. Dyekman, FH, "B-Plant 296-B-1 Stack Upstream Filter and Probe Rinse Sample and Air Filter Preparation and Analysis," CH2M-0304486, dated November 12, 2003.
 2. Interoffice Memorandum, D. L. Dyekman to K. M. Hall, "Letter of Instruction for Analysis of Radionuclides in the 296-B-1 Stack Upstream Air Sampler Probe and Air Samples," F9300-03-04, dated November 10, 2003.
 3. HNF-SD-CP-QAPP-016, "222-S Laboratory Quality Assurance Plan," Revision 7, dated April 2, 2003.

This letter report, consisting of this cover letter and five attachments, represents the final analytical data report for the 296-B-1 air sampler probe and filters. Two filters and a sampler probe were received at the 222-S Laboratory on October 1, 2003. The sample was analyzed in accordance with the "Letter of Instruction for Analysis of Radionuclides in the 296-B-1 Stack Upstream Air Sampler Probe and Air Samples," (Reference 2).

Mr. Dale L. Dyekman

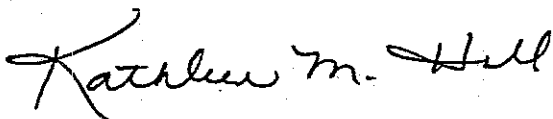
Page 2

December 9, 2003

CH2M-0304715

If you have any question regarding this report, please feel free to call Harold L. Baker at 373-6979.

Very truly yours,

A handwritten signature in cursive script that reads "Kathleen M. Hall".

Kathleen M. Hall, Director
Analytical Services Integration

dtb

Attachments (5)

CH2M-0304715

Attachment 1

Narrative

Consisting 5 pages
including the coversheet

**222-S LABORATORY
FINAL LETTER REPORT FOR THE 296-B-1 AIR SAMPLER
PROBE AND FILTERS**

1.0 INTRODUCTION

This letter report presents the results for the samples from the 296-B-1 Air Sampler received at the 222-S Laboratory on October 1, 2003. Originally these samples were to be analyzed at the Waste Sampling and Characterization Facility (WSCF); but because of high radiation levels, the samples were sent to the 222-S Laboratory for analysis. The samples were analyzed in accordance with the "Letter of Instruction for Analysis of Radionuclides in the 296-B-1 Stack Upstream Air Sample Probe and Air Samples" (LOI) referenced in the cover letter.

The Data Summary Report is presented in Attachment 2. The Sample Breakdown Diagrams are presented in Attachment 3. These diagrams show the relationships between the parent field samples and the laboratory sample identification numbers. A copy of the Chain of Custody (COC) is included as Attachment 4, and a copy of the 222-S test procedure is included as Attachment 5.

2.0 SAMPLE RECEIPT AND BREAKDOWN

On October 1, 2003, the 296-B-1 air sampler probe and 2 air filters were received at the 222-S Laboratory. The air sampler probe and air filters were loaded directly into room 2B of the Laboratory upon verification of the COC. The samples were held in room 2B until the test procedure (Attachment 5) describing the sample breakdown and analysis was written and approved.

The air sample probe consisted of a 15-inch long, ½-inch diameter stainless steel tube and the primary air sample filter. The secondary air filter had been removed from the air sample probe and was received in a sample envelope. The air sampler probe was broken down and the primary filter removed for analysis. After the removal of the primary air filter, the probe was rinsed three times with acid and each individual rinse was diluted to bring the total volume of each individual rinse to 100 mL. Initially the rinses were kept separate to allow for total alpha/beta (AT/TB) to be run on each individual rinse using a 1 mL aliquot from each sample. After this initial analysis for AT/TB, the three rinsates were combined (total volume ~ 294 mL) before the rest of the analytical work was completed.

The two filters were analyzed individually for AT/TB and gamma energy analysis (GEA). These two filters were then combined and digested in acid and brought to a final volume of 50 mL before the rest of the analytical work was completed.

3.0 ANALYTICAL RESULTS SUMMARY

The Data Summary Report (Attachment 2) presents the final analytical results. In this table, the column labeled "A#" indicates the aliquot class, or the method used for sample preparation prior to analysis. Solid samples that were prepared by environmental acid digestion were indicated with an "E." Samples with no letter identifier in this column were analyzed direct, with no separate preparation analysis or with sample preparation performed as a part of the procedure steps.

Manual calculation using rounded results from the Data Summary Report or result calculation forms may differ slightly from the actual results derived from the raw data.

Duplicate analyses were not run on the analyses for the air filters because the samples were run as an each matrix which does not allow for a duplicate analysis. Also the sample size for the probe rinsates and the solution from the acid digested filters were kept as large as possible in order to keep the detection limit as low as possible, thus not allowing for enough sample for duplicate analyses.

3.1 GAMMA ENERGY ANALYSIS

The GEA analysis was performed on each individual air filter and a 125 mL aliquot of the composited probe rinses for ^{137}Cs .

The only standards available for the GEA tests are ^{60}Co and ^{137}Cs . For GEA analytes that had a detectable amount of activity, the background activity could not be determined because of the presence of the analyte peak. Therefore, a detection limit could not be determined and the detection limit was reported as "n/a" in the Data Summary Report. When a detectable amount of activity was observed, but the counting uncertainty was greater than 50%, the level of activity detected was reported as a "less than" value for the sample result. When no detectable activity was observed for an analyte, the detection limit was reported as the minimum detectable activity (MDA) for that analyte based on the region of interest from the GEA spectrum of that sample aliquot. High activities of other gamma-emitting nuclides in the sample raise the magnitude of the analyte MDA values.

The Laboratory Control Standard (LCS) recoveries for ^{137}Cs associated with the sample analysis met the criteria listed in the LOI.

3.2 TOTAL ALPHA/BETA

The AT/TB analysis was performed on each individual air filter and a 1 mL aliquot from each of the individual probe rinses. Activity for TB was found in all samples analyzed, but the primary filter was the only sample to have alpha activity above the detection limit.

The LCS recoveries associated with the sample analyses met the criteria listed in the LOI.

3.3 STRONTIUM-90

The ^{90}Sr analysis was performed on a 1 mL aliquot of the acid digestion of the composited air filters and a 1 mL aliquot of the composited probe rinses.

All results were corrected for the recovery of the carrier. For a positive result, the detection limit is calculated based on a calculated number then corrected for the sample size and recovery. For a less than result, the result is used as the detection limit and then is corrected for the sample size and recovery.

The LCS recoveries associated with the sample analysis met the criteria listed in the LOI. A low level of ^{90}Sr was found in the blank associated with the rinsate composite, but the level was insignificant when compared to the results. No reanalysis was requested.

3.4 AMERICIUM-241

The ^{241}Am analysis was performed on a 25 mL aliquot of the acid digestion of the composited air filters and a 125 mL aliquot of the composited probe rinses. A ^{243}Am tracer also was used with each of the samples and the results were corrected for the tracer recovery. Americium-241 was not found above the detection limit in any of the samples.

The LCS recoveries for ^{241}Am associated with the sample analyses met the criteria listed in the LOI.

3.5 PLUTONIUM-238 and PLUTONIUM 239/240

The ^{238}Pu and $^{239/240}\text{Pu}$ analyses were performed on a 25 mL aliquot of the acid digestion of the composited air filters and a 125 mL aliquot of the composited probe rinses. Plutonium-238 was not found above the detection limit, but low levels of $^{239/240}\text{Pu}$ was found in both samples.

A tracer was used with each of the samples. The reported ^{238}Pu and $^{239/240}\text{Pu}$ results were corrected for the tracer recovery. No standard is available for the ^{238}Pu analysis; therefore, the standard is reported as "n/a" in the Data Summary Report (Attachment 2):

The detection limit was based on recovery of a tracer; therefore, as recovery decreases, detection increases.

The LCS recoveries associated with the sample analysis met the criteria listed in the LOI.

4.0 PROCEDURES

Table 1 lists the analytical procedures used for analysis of the 296-B-1 Air Sampler.

Table 1: Analytical Procedures

Analysis	Preparation Method	Analysis Procedure
Total Alpha/Bets	Direct	LA-508-101 Rev. I-1
⁹⁰ Sr	Acid digest for filters Direct for probe rinses	LA-220-103 Rev. F-10 LA-220-101 Rev. F-0
^{238, 239/240} Pu, ²⁴¹ Am	Acid digest for filters Direct for probe rinses	LA-953-104 Rev. D-1
¹³⁷ Cs	Direct	LA-548-121 Rev. F-5

Notes:

Environmental Digest - LA-549-133 Rev. C-4

CH2M-0304715

Attachment 2

Data Summary Report

Consisting 8 pages
including the coversheet

Attachment 2
296B1 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler
SEGMENT #: Primary Filter

SEGMENT PORTION: Each

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S03B000006			Cesium-137 by GEA	uCi/Sample	94.5	<1.90e-05	0.0344	n/a	n/a	n/a	n/a	n/a	0.63	
S03B000006			Alpha Env: Solid/Misc (Each)	uCi/Sample	93.0	<2.95e-07	2.92e-06	n/a	n/a	n/a	n/a	7.1e-07	29	
S03B000006			Beta in Env. Samples (Each)	uCi/Sample	105	<1.06e-06	0.123	n/a	n/a	n/a	n/a	3.8e-06	0.27	

Attachment 2
296B1 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler

SEGMENT #: Secondary Filter

SEGMENT PORTION: Each

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S03B000007			Cesium-137 by GEA	uCi/Sample	111	<9.57e-06	5.13e-04	n/a	n/a	n/a	n/a	n/a	4.7	
S03B000007			Alpha Env: Solid/Misc (Each)	uCi/Sample	88.4	<3.27e-07	<3.97e-07	n/a	n/a	n/a	n/a	8.1e-07	5.0e+02	
S03B000007			Beta in Env. Samples (Each)	uCi/Sample	105	<1.21e-06	8.47e-04	n/a	n/a	n/a	n/a	2.5e-06	1.3	

Attachment 2
29681 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler
SEGMENT #: Comp Filter

SEGMENT PORTION: Each

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S03B000008	E		Sr-89/90 Env. Misc. (ea.)	uCi/Sample	98.7	<1.03e-04	0.0714	n/a	n/a	n/a	n/a	2.1e-04	1.8	
S03B000008	E		Pu-239/240 by TRU-SPEC Resin	uCi/Sample	91.0	<1.06e-05	1.04e-05	n/a	n/a	n/a	n/a	9.8e-06	8.2	
S03B000008	E		Pu-238 by TRU-SPEC Resin IonEx	uCi/Sample	n/a	<1.56e-05	<1.48e-05	n/a	n/a	n/a	n/a	1.5e-05	11	
S03B000008	E		Am-241 by TRU-SPEC Resin IonEx	uCi/Sample	106	<9.15e-06	<9.06e-06	n/a	n/a	n/a	n/a	9.1e-06	12	

Attachment 2
296B1 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler
SEGMENT #: Rinse 1

SEGMENT PORTION: Liquid

Sample#	R A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S03B000002		Alpha in Liquid Samples	uci/mL	87.7	<3.71e-07	<7.15e-07	n/a	n/a	n/a	n/a	8.4e-07	5.0e+02	
S03B000002		Beta in Liquid Samples	uci/mL	106	<1.27e-05	3.36e-03	n/a	n/a	n/a	n/a	2.5e-06	0.64	

Attachment 2
29681 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler
SEGMENT #: Rinse 2

SEGMENT PORTION: Liquid

Sample#	R A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S038000003		Alpha in Liquid Samples	UCI/mL	87.7	<3.7e-07	<3.43e-07	n/a	n/a	n/a	n/a	8.4e-07	5.0e+02	
S038000003		Beta in Liquid Samples	UCI/mL	106	<1.27e-05	1.22e-04	n/a	n/a	n/a	n/a	2.5e-06	3.5	

Attachment 2
296B1 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler
SEGMENT #: Rinse 3

SEGMENT PORTION: Liquid

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S03B000004			Alpha in Liquid Samples	uCi/mL	87.7	<3.71e-07	<6.47e-07	n/a	n/a	n/a	n/a	8.4e-07	5.0e+02	
S03B000004			Beta in Liquid Samples	uCi/mL	106	<1.27e-05	4.70e-05	n/a	n/a	n/a	n/a	2.5e-06	6.2	

Attachment 2
296B1 SAMPLR
Data Summary Report

CORE NUMBER: 296-B-1 Sampler

SEGMENT #: Composite -- Probe Rinses, 300 ml total original sample volume

SEGMENT PORTION: Liquid

Sample#	R A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%	Qual Flags
S038000005		Strontium-89/90 High Level	uCi/mL	94.3	2.62e-07	3.88e-04	n/a	n/a	n/a	n/a	4.3e-07	1.1	
S038000005		Pu-239/240 by TRU-SPEC Resin	uCi/mL	87.4	<7.89e-08	3.88e-08	n/a	n/a	n/a	n/a	2.7e-08	6.9	
S038000005		Pu-238 by TRU-SPEC Resin IonEx	uCi/mL	n/a	<9.87e-08	<4.71e-08	n/a	n/a	n/a	n/a	4.7e-08	1.0e+02	
S038000005		Cesium-137 by GEA	uCi/mL	99.9	<2.40e-07	4.74e-04	n/a	n/a	n/a	n/a	n/a	0.73	
S038000005		Am-241 by TRU-SPEC Resin IonEx	uCi/mL	105	<4.21e-08	<5.70e-08	n/a	n/a	n/a	n/a	5.7e-08	8.6	

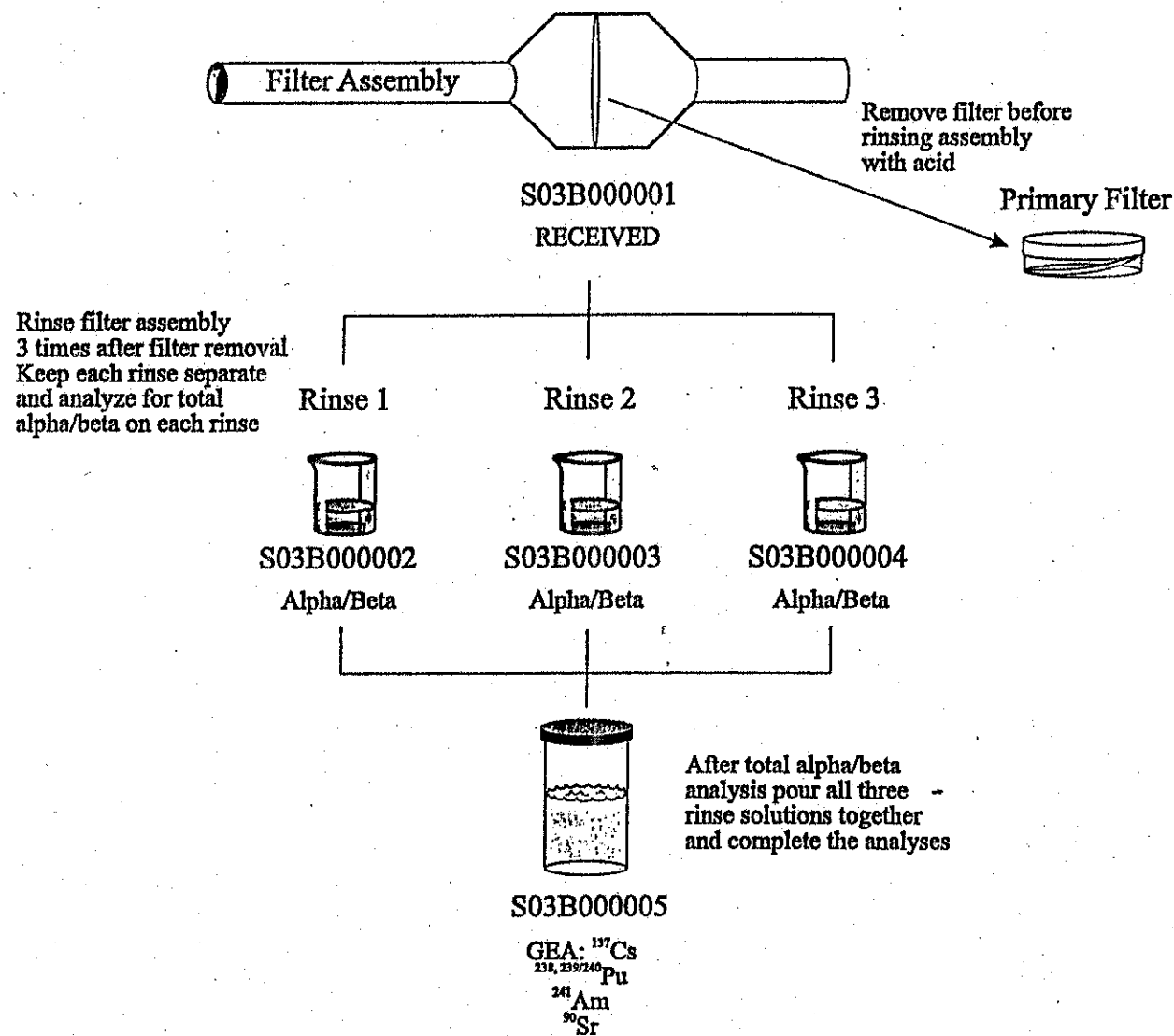
CH2M-0304715

Attachment 3

Sample Breakdown Diagrams

Consisting 3 pages
including the coversheet

296B1 SAMPLER
Filters and Solutions
Group 20030367



296B1 SAMPLER
Filters and Solutions
Group 20030367

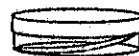
Primary Filter



S03B000006

Alpha/Beta
GEA:¹³⁷Cs

Secondary Filter



S03B000007

Alpha/Beta
GEA:¹³⁷Cs

Composite
Filters



Environmental
Digest



S03B000008

^{238, 239/240}Pu
²⁴¹Am
⁹⁰Sr

CH2M-0304715

Attachment 4

Chain of Custody

Consisting 2 pages
including the coversheet

J-7	RESOLUTION/RETEST	CP-03-151 /W
		WCN #1
	B-PLANT UPSTREAM AIR SAMPLING	PAGE 2 OF 2

ATTACHMENT 3

B-Plant

UPSTREAM AIR SAMPLE CHAIN-OF-CUSTODY

Company: FH

Company Contact: Dan Johnson, 373-4209

Analysis Request: Gross Alpha/Beta on each individually (primary, secondary, and probe rinses), then combine all for GEA, Sr-90, Pu isotopic, Am-241.

~~20031332~~ ^{9/14/03}

Sample Number	Sample Point ID	On		Off		On Flow Rate (scfm)	Off Flow Rate (scfm)	Comments
		Date	Time	Date	Time			
1	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	2.5	2.2	N/A
2	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	2.5	2.2	N/A
Probe	296-B-1 Upstream	09-15-03	1410	09-19-03	1026	N/A	N/A	Decon probe and filter holder for re-use. Include this as part of the probe sample.

Sample Collected By: [Signature] 1 [Redacted]
Signature HID#

Relinquished By: [Signature] 1 [Redacted]
Signature HID#

Received By: [Signature] 1 [Redacted]
Signature HID#

Relinquished By: [Signature] 1 [Redacted]
Signature HID#

Received By: [Signature] 1 [Redacted]
Signature HID#

Relinquished By: [Signature] 1 [Redacted]
Signature HID#

Received by [Signature] 1 [Redacted]
Signature HID#

LABORATORY
FINAL SAMPLE DISPOSAL METHOD: _____

Date: 9-19-03 Time: 1156

Date: 9/19/03 Time: 11:52

Date: 10/1/03 Time: 13:10

Date: 10-1-03 Time: 1310

Date: 10-1-03 Time: 1330

10/1/03 1330

By: _____ Date: _____ Time: _____
Signature

CH2M-0304715

Attachment 5

Analytical Test Procedure

Consisting 11 pages
including the coversheet

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author

Robert W. Schroeder
373-5810

Addressee

D. L. Dyekman, FH

Correspondence No.

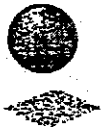
CH2M-0304486

Subject:

B-PLANT 296-B-1 STACK UPSTREAM FILTER AND PROBE RINSE SAMPLE
AND AIR FILTER PREPARATION AND ANALYSIS

DISTRIBUTION

Approval	Date	Name
		CH2M HILL Correspondence Control H6-08
		<u>CH2M HILL Hanford Group, Inc.</u>
		H. L. Baker T6-12
		S. A. Catlow T6-50
		K. M. Hall T6-12
		B. R. Hill T6-03
		K. L. Powell T6-04
		D. L. Renberger T6-03
		R. W. Schroeder T6-50
		ATS File/LB



CH2MHILL
Hanford Group, Inc.

CH2M HILL
Hanford Group, Inc.
P.O. Box 1500
Richland, WA 99352

November 12, 2003

CH2M-0304486

Mr. Dale L. Dyekman, Environmental Engineer
Monitoring and Reporting
Fluor Hanford, Inc.
Post Office Box 1000
Richland, Washington 99352

Dear Mr. Dyekman:

**B-PLANT 296-B-1 STACK UPSTREAM FILTER AND PROBE RINSE SAMPLE AND AIR
FILTER PREPARATION AND ANALYSIS**

Attached is the test plan to be used for B-Plant 296-B-1 Stack Upstream Filter and Probe Rinse Sample and Air Filter Preparation and Analysis. The test plan outlines the steps required to prepare the samples for analysis. The laboratory procedures to be used for analysis are also listed in the test plan.

If you have any questions, please contact Stan Catlow at 373-0738 or myself at 373-5810.

Very truly yours,

A handwritten signature in cursive script that reads "Robert W. Schroeder".

Robert W. Schroeder, Lead
Analytical Technical Services

dtb

Attachment

CH2M-0304486

Attachment

B-Plant 296-B-1 Upstream Filter and Probe Rinse Sample and Air Filter Preparation and Analysis

Consisting 8 pages
including the coversheet

**B-Plant 296-B-1 Stack Upstream Filter and
Probe Rinse Sample and Air Filter
Preparation and Analysis**

Stanley A. Catlow
CH2M HILL Hanford Group, Inc.

Date Published
November 2003



CH2MHILL
Hanford Group, Inc.

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TERMS

AT/TB	total alpha/total beta
GAB	gross alpha and beta
GEA	gamma energy analysis
LOI	letter of instruction
PVC	Polyvinyl chloride

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1.0 PURPOSE

The purpose of this test plan is to outline steps to provide analytical measurement results supporting the letter of instruction (LOI) F9300-03-04 for the analysis of the upstream sampling probe and two filters for the 296-B-1 stack.

2.0 SCOPE

This test plan outlines the method of sampling the inside of the probe from the filter-attach point, excluding the filter housing itself, to the end of the probe, and the subsequent analysis of the two associated air filters and samplings of the probe.

3.0 IMPLEMENTATION

This plan will be implemented by the 222-S Analytical Laboratory upon plan approval.

4.0 QUALITY ASSURANCE AND CONTROL

As specified by the LOI, the analytical work will be controlled by HNF-EP-0835-9, *Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Environmental Compliance Program during Calendar Year 2003*, and will comply with HNF-SD-CP-QAPP-016, *222-S Laboratory Quality Assurance Plan*.

5.0 SAFETY

The equipment and reagents identified in this test plan do not have hazards beyond those normally found in an analytical laboratory. Before starting this test plan, the user should review the equipment list and reagent list and ensure familiarity with each applicable safety precaution. In addition to equipment and reagents hazards, there may be other hazards associated with this sample. Follow each applicable laboratory safety precaution for handling radioactive materials, hazardous chemicals, and hazardous wastes.

Personnel handling chemicals must follow ATS-310 Analytical Technical Services, 222-S Administrative Procedure, Section 4.05, 222-S Laboratory Complex Chemical Hygiene Plan. For radiological hazards, personnel shall comply with HNF-5183 and HNF-MP-5184.

6.0 REAGENTS

4M Nitric Acid (HNO₃)

Dilute 250 milliliters of concentrated nitric acid to 1 L with water. Store in glass or plastic container. Shelf life is 5 years.

7.0 MATERIAL AND EQUIPMENT

The following material and equipment is used:

- 2-inch stainless steel dishes
- 2-inch cardboard dish holders
- Polyvinyl chloride (PVC) bottle to fit sample digestion.

8.0 WASTE GENERATION

No liquid wastes are expected from this test plan because all solutions become samples for subsequent analytical procedures.

All waste will be managed in accordance with LO-100-151.

Rinsed probe assembly will be returned to the customer.

9.0 PROCEDURE STEPS

Table 9-1 shows the analyses for each sample.

Table 9-1. Analyses for Each Sample.

Matrix	Analysis
Filter (individual)	GAB, GEA
Ashed Filter Composite	Pu/Am (in duplicate)
	Sr (in duplicate)
Rinse 1,2,3	GAB
Rinse Composite (450 mLs)	GEA
	Pu/Am (in duplicate)
	Sr (in duplicate)

GAB = gross alpha and beta.

GEA = gamma energy analysis.

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The following data need to be included on the batch sheets and in the final reports:

Filter composite volume: _____

Rinse 1 volume: _____

Rinse 2 volume: _____

Rinse 3 volume: _____

Rinse composite volume: _____

Refer to Figure 9-1 in LOI F9300-03-04 for disassembly of air-sample probe.

9.1 FILTERS

1. After carefully noting the flow direction, separate filter housing from probe.
2. Open the filter housing and remove the filter.
3. Mount the filter onto a 2-inch stainless steel dish (upstream side facing up), per LA-508-101, *Alpha and Beta Samples*.
4. Mount the second filter (contained in air sample envelope), per LA-508-101.
5. Send mounts to counting room for total alpha/total beta (AT/TB), per LA-508-101.
6. Return mounts for remounting for gamma energy analysis (GEA), per LA-548-121, *Preparation of Sample Mounts for Gamma Energy Analysis*.
7. Perform GEA analysis, per LA-508-162, *Gamma Energy Analysis-The Genie System*.
8. Request return of filters for compositing and/or ashing, per LA-549-133, *Nitric Acid Hydrogen Peroxide Oxidation of Organic Matter (Environmental Digest)*.
9. Perform plutonium/americium analyses on the filter composite, per LA-953-104, *Determination of Plutonium and Americium Using Eichrom Resin Separation and Neodymium Fluoride Precipitation Plating*, and LA-542-104, *Co-Precipitation of Transuranics for Alpha Energy Analysis (AEA)*.
10. Perform strontium analysis on the filter composite, per LA-220-103, *Strontium 90 in Leachates of Soil, Vegetation, Air Filters and Other Solid Samples*.

9.2 RINSES

1. Plug one end of the probe with a clean rubber stopper.
2. Fill the probe with 4M nitric acid.
3. Allow the acid to remain in the probe for 30 to 60 minutes.
4. Drain the acid from the probe into a clean labeled beaker.
5. Repeat steps 2 through 4 twice more, transferring the rinses into a separate, clean, labeled beaker for each rinse.
6. Dilute each rinse to a known volume.

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7. Transfer each volume into labeled PVC bottle.
8. Analyze an appropriate volume of each rinse for AT/TB, per LA-508-101.
9. After AT/TB result has been verified, combine the three rinses into a single composite and record the total volume.
10. Mount appropriate volume of sample for GEA analysis, per LA-548-121.
11. Perform GEA analysis, per LA-508-162.
12. Perform plutonium/ameridium analyses on the rinse composite, per LA-953-104 and LA-542-104.
13. Perform strontium analysis on the filter composite, per LA-220-103.

10.0 BIBLIOGRAPHY

- ATS-310 Analytical Technical Services, 222-S Administrative Procedure, Section 4.05, 222-S Laboratory Complex Chemical Hygiene Plan.
- HNF-5183, *Tank Farms Radiological Control Manual*.
- HNF-6806, 2000, *Analytical Services Quality Assurance Program Plan*, Revision 0A, Fluor Hanford, Richland, Washington.
- HNF-EP-0835-9, 2003, *Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Environmental Compliance Program during Calendar Year 2003*, Revision 0, Fluor Hanford, Richland, Washington.
- HNF-MP-5184, *Radiation Protection Program*.
- HNF-RD-11183, *Personal Protection*.
- HNF-RD-13299, *Hazard Communication*.
- HNF-SD-CP-QAPP-016, 222-S Laboratory Quality Assurance Plan, Revision 7, dated 4/2/2003.
- LA-220-103, *Strontium 90 in Leachates of Soil, Vegetation, Air Filters and Other Solid Samples*.
- LA-508-101, *Alpha and Beta Samples*.
- LA-508-162, *Gamma Energy Analysis-The Genie System*.
- LA-542-104, *Co-Precipitation of Transuranics for Alpha Energy Analysis (AEA)*.
- LA-548-121, *Preparation of Sample Mounts for Gamma Energy Analysis*.
- LA-549-133, *Nitric Acid Hydrogen Peroxide Oxidation of Organic Matter (Environmental Digest)*.
- LA-953-104, *Determination of Plutonium and Americium Using Eichrom Resin Separation and Neodymium Fluoride Precipitation Plating*.
- LO-100-151, *Laboratory Waste Generation*.
- LOI-F9300-03-04, *Letter of Instruction for Analysis of Radionuclides in the 296-B-1 Stack Upstream Air Sample Probe and Air Samples*.

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Approvals:

H. Anastos 11/11/03
H. L. Anastos, Deputy Manager Analytical Services Date

Kathleen M. Hall 11/11/03
K. M. Hall, Manager, Analytical Services Integration Date

G. A. Clark 11/11/03
G. A. Clark, Quality Assurance Date

L. E. Borneman 11/11/03
L. E. Borneman, Manager, ATS Environmental Compliance Date

J. C. Dupaquier 11/11/03
J. C. Dupaquier, Manager, ATS Radiological Control Date

D. L. Dyekman 11-11-03
D. L. Dyekman, Environmental Monitoring and Reporting Date